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NUMERICAL EVALUATION OF SPECIAL FUNCTIONS

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ABSTRACT. This document is an excerpt from the current hypertext version of an article that appeared in Walter Gautschi (ed.), *Mathematics of Computation 1943–1993: A Half-Century of Computational Mathematics*, Proceedings of Symposia in Applied Mathematics 48, American Mathematical Society, Providence, RI 02940, 1994. The symposium was held at the University of British Columbia August 9–13, 1993, in honor of the fiftieth anniversary of the journal *Mathematics of Computation*.

The original abstract follows.

Higher transcendental functions continue to play varied and important roles in investigations by engineers, mathematicians, scientists and statisticians. The purpose of this paper is to assist in locating useful approximations and software for the numerical generation of these functions, and to offer some suggestions for future developments in this field.

5. Functions of Two or More Variables

As in §4, an indication is made of the programming language where applicable and special note is made of references that include surveys. Libraries and interactive systems are listed separately, and similar remarks apply about the inclusiveness of the subsections.

5.1. Bessel Functions. [6]
5.2. Coulomb Wave Functions. [7]
5.3. Elliptic Integrals and Functions. [8]
5.4. Fermi-Dirac, Bose-Einstein, and Debye Integrals. [9]
5.5. Hypergeometric and Confluent Hypergeometric Functions. [10]
5.6. Incomplete Bessel Functions, Incomplete Beta Function. [11]

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[1] /nesf/Sect0/Sect0.html
[2] /nesf/Sect4-7/Sect4-7.html
[3] /nesf/Sect5-1/Sect5-1.html
[4] ftp://gams.nist.gov/pub/lozier/nesf/Paper.ps.Z
[5] ftp://gams.nist.gov/pub/lozier/nesf/Sect5.ps.Z

1991 *Mathematics Subject Classification.* Primary 65D20; Secondary 33-00.
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[6] /nesf/Sect5-1/Sect5-1.html
[7] /nesf/Sect5-2/Sect5-2.html
[8] /nesf/Sect5-3/Sect5-3.html
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[10] /nesf/Sect5-5/Sect5-5.html
[11] /nesf/Sect5-6/Sect5-6.html

5.7. Incomplete Gamma Functions, Generalized Exponential Integrals. [12]
5.8. Legendre and Associated Legendre Functions. [13]
5.9. Mathieu, Lamé, and Spheroidal Wave Functions. [14]
5.10. Orthogonal Polynomials. [15]
5.11. Polylogarithms (Generalized). [16]
5.12. Struve and Anger-Weber Functions. [17]
5.13. Weber Parabolic Cylinder Functions. [18]
5.14. Zeta Function (Generalized). [19]

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[18] /nesf/Sect5-13/Sect5-13.html
[19] /nesf/Sect5-14/Sect5-14.html